



Assessment of climate change impacts on flooding vulnerability for lowland management in southwestern Taiwan

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Abstract:

Taiwan suffers from losses of economic property and human lives caused by flooding almost every year. Flooding is an inevitable, reoccurring, and the most damaging disaster in Taiwan since Taiwan is located in the most active tropic cyclone formation region of the Western Pacific. Flooding problem is further worse in land subsidence areas along southwestern coast of Taiwan due to groundwater overdraft. Increasing number of people is threatened with floods owing to climate change since it would induce sea level rise and intensify extreme rainfall. Assessments of flooding vulnerability depend not only on flooding severity, possible damage of assets exposed to floods should also be simultaneously considered. This paper aims at exploring how climate change might impact the flooding vulnerability of lowland areas in Taiwan. A flooding vulnerability evaluation scheme is proposed in this study which incorporates flooding severity (the maximum inundation depth determined by a two-dimensional model) and potential economic losses for various land uses. Effects of climate change on flooding vulnerability focus on alterations of rainfall depth for various recurrence intervals. The flood-prone Yunlin coastal area, located in southwestern Taiwan, is chosen to illustrate the proposed methodology. The results reveal that reducing flooding vulnerability can be achieved by either reducing flooding severity (implementation of flood-mitigation measures) or decreasing assets exposed to floods (suspension of land uses for flood-detention purpose). Performance of currently implemented flood-mitigation measures is insufficient to reduce flooding vulnerability when facing with climate change. However, the scenario suggested in this study to sustain room for floods efficiently reduces flooding vulnerability in both without- and with climate change situations. The suggestions provided in this study could support decision processes and help easing flooding problems of lowland management in Taiwan under climate change.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event

Extreme Weather Event: Flooding, Hurricanes/Cyclones

Geographic Feature:

resource focuses on specific type of geography

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Ocean/Coastal

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: Other Asian Country

Other Asian Country: Taiwan

Health Impact:

specification of health effect or disease related to climate change exposure

Morbidity/Mortality

Intervention:

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type:

format or standard characteristic of resource

Research Article

Resilience:

capacity of an individual, community, or institution to dynamically and effectively respond or adapt to shifting climate impact circumstances while continuing to function

A focus of content

Timescale:

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

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A focus of content